

SAFETY SYRINGE/CATHETER

Field of Invention

The invention pertains to medical devices and more particularly to syringes and
5 catheters designed to protect patients and health care workers from unintentional needle
sticks and to prevent leakage of fluid from the device after use.

Background of the Invention

In the wake of the HIV epidemic, new and more virulent strains of hepatitis and
10 other blood related diseases, health care workers have become increasingly aware of the
potential for deadly consequences related to accidental or unintentional needle sticks or
other contact with contaminated bodily fluids. As catheters and syringes are used in
immense numbers in modern hospitals and other health care facilities, the opportunity for
injury and resulting contamination is significant.

15 Various devices have been invented in an effort to prevent such injuries. U.S.
Patent No. 5,733,264 issued to *Flowers* in 1998 discloses a syringe equipped with a sliding
tubular shield that slides over the exposed needle after use and locks in place. This shield
is, however, open on the distal end, thus permitting fluids to leak from the needle and out
the end of the shield. U.S. Patent No. 5,342,309 issued to *Hausser* in 1994 is similar in
20 design to the *Flowers* invention, however employing different means for locking the safety
shield in the distal position. Like *Flowers*, it would appear to be nearly impossible to
position this shield over the needle with one hand.

U.S. Patent No. 5,743,887 issued to *Brattesani* in 1998 provides for a docking base to help protect the health care worker while attaching and removing the needle from the syringe device. This invention fails to provide a means to control leaks from the needle even though it is encased in a movable safety shield. Likewise, the movement of this shield cannot be easily controlled with one hand. U.S. Patent No. 5,385,555 issued to *Hausser* in 1995 is directed towards a syringe having a lockable safety shield slidably positionable over the needle after use. This device also requires two hands to operate and makes no provision for containing any fluid that may drip from the needle.

U.S. Patent No. 5,647,849 issued to *Kalin* in 1997 discloses a safety syringe having a slidable barrel that can be positioned over the needle to prevent unwanted injuries. The syringe is provided with a removable seal at the end of the barrel. However, once this seal is removed, there is no convenient way of reattaching the seal to the barrel and thus the potential for leakage remains. Of a slightly different nature, U.S. Patent No. 4,820,282 issued to *Hogan* in 1987 relates to a sheath for use in removing hypodermic needles from patients and retaining the point of the removed needle in the sheath when the needle and sheath are disposed of so as to protect against accidentally being pricked.

It is an objective of the invention to provide a means to effectively shield the needle of a syringe or catheter after the device is removed from a patient, thereby preventing accidental needle sticks. It is a further objective of the invention to prevent leakage of fluids from the needle of the catheter or syringe after use. It is yet a further objective of the invention that the shielding capability can be operated with the hand that is operating the syringe or removing the catheter. It is still a further objective of the invention that the safety shield is simple and inexpensive to manufacture.

Summary of the Invention

A safety syringe may be constructed from the following components. A hollow body is provided. The body is of a first predetermined length and has an outer surface, a first end, a second end, cylindrical bore of a first predetermined diameter. Means are provided for gripping the hollow body adjacent the second end. The first end of the hollow body includes an opening of the first predetermined diameter. The second end includes a cavity extending from the cylindrical bore and terminating in an outlet portion. The outlet portion has a first end, a center section and a second end and is fixedly attached at its first end to the cavity. The outlet portion includes an orifice of a second predetermined diameter that extends outwardly from the cavity.

A hollow needle is provided. The needle has a first end and a second end and is fixedly attached at its first end to the second end of the outlet portion such that fluid may travel from the cylindrical bore, through the cavity, through the and through the needle. A plunger is provided. The plunger has a longitudinal shaft longer than the first predetermined length, a first end and a second end, a thumb pad fixedly attached to the first end of the shaft, and a piston. The piston is formed of a resilient material, attached to the second end of the shaft, and is sized and shaped to fit sealably within the cylindrical bore of the hollow body.

A needle shield is provided. The shield has an outer surface, a first end, a second end, and is sized and shaped to fit slidably over the needle and at least a portion of the hollow body of the syringe. Means are provided for securing the needle shield at its first end to the hollow body in a first position. The first position permits the second end of the needle to extend outwardly from the second end of the shield. A second position permits

the second end of the needle shield to extend beyond the second end of the needle. Means are provided for moving the needle shield from the first position to the second position using a single hand. Means are provided for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the hollow body in

5 the second position.

In a variant of the invention, the means for securing the needle shield at its first end to the hollow body in first and second positions further includes a first surrounding groove. The first groove is located on the outer surface of the hollow body adjacent its second end. A second surrounding groove is provided. The second groove is located on the outer

10 surface of the hollow body adjacent its first end. An engaging finger is provided. The finger is formed of resilient material and has an upper surface, a lower surface, an activating end, an attaching end and a pivot point located between the ends. A securing tooth is provided. The tooth has an upper end and a lower end and is fixedly attached at its upper end to the lower surface of the engaging finger adjacent the attaching end. The

15 securing tooth is sized, shaped and located to removably engage one of the first and second surrounding grooves on the hollow body.

A mounting post is provided. The post has an upper end, a lower end and is fixedly mounted at its lower end to the outer surface of the needle shield adjacent its first end. The post is fixedly attached at its upper end to the lower surface of the engaging finger at the

20 pivot point such that the resilient material of the engagement finger will bias the securing tooth downwardly to removably engage one of the first and second surrounding grooves. When pressure is applied to the upper surface of the engaging finger adjacent its activating end the securing tooth will pivot upwardly away from one of the first and second securing

grooves, permitting the needle shield to move slidably from the first position to the second position. When the securing tooth is positioned over one of the first and second securing grooves and pressure is relieved from the upper surface of the engaging finger the securing tooth will engage one of the grooves, preventing further movement of the needle shield.

5 In yet another variant, the means for moving the needle shield from the first position to the second position using a single hand further comprises an indentation located on the outer surface of the needle shield adjacent its first end and is sized and shaped to engage a finger pad of a user.

10 In still a further variant of the invention, the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the hollow body in the second position includes a sealing membrane. The membrane is fixedly attached to the second end of the needle shield and permits the hollow needle and the second end and center section of the outlet portion to pass through the membrane when the needle shield is in the first position. The sealing membrane is capable of sealing the
15 second end of the needle shield when the shield is in the second position with the hollow needle and outlet portion withdrawn within the shield.

In another variant, the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the hollow body in the second position includes a sealing membrane. The membrane is fixedly attached to the
20 second end of the needle shield and permits the hollow needle to pass through the membrane when the needle shield is in the first position. The sealing membrane is capable of sealing the second end of the needle shield when the shield is in the second position with the hollow needle withdrawn within the shield.

In still another variant of the invention, the needle shield is formed of a resilient material and the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the hollow body in the second position includes a flattened closure means formed at the second end of the needle shield.

5 The closure means has a pair of mating lips at the second end permitting the hollow needle and the second end and center section of the outlet portion to pass between them when the needle shield is in the first position. The lips are capable of sealing the second end of the needle shield when the shield is in the second position with the hollow needle and outlet portion withdrawn within the shield.

10 In a further variant, the needle shield is formed of a resilient material and the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the hollow body in the second position includes a flattened closure means formed at the second end of the needle shield. The closure means has a pair of mating lips at the second end permitting the hollow needle to pass between them when
15 the needle shield is in the first position. The lips are capable of sealing the second end of the needle shield when the shield is in the second position with the hollow needle withdrawn within the shield.

In still a further variant of the invention, a safety infusion set includes a length of flexible tubing having a first end and a second end. A hollow catheter body is provided.

20 The body has a first end, a second end, an outer surface and an outlet portion, and is fixedly attached at its first end to the first end of the tubing. A pair of attachment wings is provided. The attachment wings are fixedly attached to the outer surface of the catheter body. The outlet portion has a first end, a center section and a second end and is fixedly

attached at its first end to the second end of the catheter body. A connection fitting
 attached to the second end of the tubing. A hollow needle is provided. The needle has a
 first end and a second end and is fixedly attached at its first end to the second end of the
 outlet portion such that fluid may pass from the flexible tubing, through the catheter body
 5 and the outlet portion and outwardly through the hollow needle.

A needle shield is provided. The shield has an outer surface, a first end, a second end,
 and is sized and shaped to fit slidably over the needle, outlet portion, and at least a portion
 of the catheter body. The needle shield has a cylindrical portion beginning at the second
 end of the shield. The cylindrical portion has an outer end and an inner end and is sized and
 10 shaped to fit over the outlet portion, and a slotted portion. The slotted portion has a
 longitudinal slot, extending from the inner end of the cylindrical portion toward the first
 end of the shield. The slotted portion is sized and shaped to fit slidably over the hollow
 catheter body with the slot accommodating an intersection of the wings and the catheter
 body.

15 Means are provided for securing the needle shield at its first end to the catheter
 body in a first position. The first position permits the second end of the needle to extend
 outwardly from the second end of the shield. A second position permits the second end of
 the needle shield to extend beyond the second end of the needle. Means are provided for
 moving the needle shield from the first position to the second position using a single hand.
 20 Means are provided for containing any fluid leaking from the second end of the needle
 within the needle shield when the shield is secured to the catheter body in the second
 position.

In yet another variant, the means for securing the needle shield at its first end to the catheter body in first and second positions includes a first surrounding groove. The first groove is located on the outer surface of the catheter body adjacent its second end. A second surrounding groove is provided. The second groove is located on the outer surface of the catheter body adjacent its first end. An engaging finger is provided. The finger is formed of resilient material and has an upper surface, a lower surface, an activating end, an attaching end and a pivot point located between the ends. A securing tooth is provided. The tooth has an upper end and a lower end and is fixedly attached at its upper end to the lower surface of the engaging finger adjacent the attaching end.

The securing tooth is sized, shaped and located to removably engage one of the first and second surrounding grooves on the catheter body. A mounting post is provided. The post has an upper end, a lower end and is fixedly mounted at its lower end to the outer surface of the needle shield adjacent its first end. The post is fixedly attached at its upper end to the lower surface of the engaging finger at the pivot point such that the resilient material of the engagement finger will bias the securing tooth downwardly to removably engage one of the first and second surrounding grooves.

When pressure is applied to the upper surface of the engaging finger adjacent its activating end the securing tooth will pivot upwardly away from one of the first and second securing grooves, permitting the needle shield to move slidably from the first position to the second position. When the securing tooth is positioned over one of the first and second securing grooves and pressure is relieved from the upper surface of the engaging finger the securing tooth will engage one of the grooves, preventing further movement of the needle shield.

In still a further variant, the means for moving the needle shield from the first position to the second position using a single hand further includes an indentation. The indentation is located upon the outer surface of the needle shield adjacent its first end and is sized and shaped to engage a finger pad of a user.

5 In yet another variant of the invention, the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the catheter body in the second position includes a first sealing membrane. The membrane is fixedly attached to the outer end of the cylindrical portion of the needle shield and permits the hollow needle and the second end and center section of the outlet portion to pass
10 through the membrane when the needle shield is in the first position. A second sealing membrane is provided. The second membrane is fixedly attached to the inner end of the cylindrical portion of the needle shield and permits the hollow needle and the second end and center section of the outlet portion to pass through the membrane when the needle shield is in the first position. The first sealing membrane is capable of sealing the outer
15 end of the cylindrical portion of the needle shield when the shield is in the second position with the hollow needle positioned within the cylindrical portion. The second sealing membrane is capable of sealing the inner end of the cylindrical portion of the needle shield about the needle when the shield is in the second position with the outlet portion positioned within the slotted portion of the shield.

20 In still a further variant, the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the catheter body in the second position includes a first sealing membrane. The first membrane is fixedly attached to the outer end of the cylindrical portion of the needle shield and permits the

hollow needle to pass through the membrane when the needle shield is in the first position.

A second sealing membrane is provided. The second membrane is fixedly attached to the inner end of the cylindrical portion of the needle shield and permits the hollow needle to pass through the membrane when the needle shield is in the first position. The first sealing
 5 membrane being capable of sealing the outer end of the cylindrical portion of the needle shield when the shield is in the second position with the hollow needle positioned within the cylindrical portion. The second sealing membrane is capable of sealing the inner end of the cylindrical portion of the needle shield about the needle when the shield is in the
 10 second position with the outlet portion positioned within the slotted portion of the shield.

In yet another variant, the needle shield is formed of a resilient material and the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the catheter body in the second position includes a flattened closure means formed at outer end of the cylindrical portion of the needle shield. The closure means has a pair of mating lips at the outer end permitting the hollow needle and
 15 the second end and center section of the outlet portion to pass between them when the needle shield is in the first position. A sealing membrane is provided. The membrane is fixedly attached to the inner end of the cylindrical portion of the needle shield and permits the hollow needle and the second end and center section of the outlet portion to pass
 20 through the membrane when the needle shield is in the first position. The lips are capable of sealing the outer end of the cylindrical portion of the needle shield when the shield is in the second position with the hollow needle positioned within the cylindrical portion. The sealing membrane is capable of sealing the inner end of the cylindrical portion of the

needle shield about the needle when the shield is in the second position with the outlet portion positioned within the slotted portion of the shield.

In a final variant, the needle shield is formed of a resilient material and the means for containing any fluid leaking from the second end of the needle within the needle shield when the shield is secured to the catheter body in the second position includes a flattened closure means formed at the second end of the needle shield. The closure means has a pair of mating lips at the second end permitting the hollow needle to pass between them when the needle shield is in the first position. A sealing membrane is provided. The membrane is fixedly attached to the inner end of the cylindrical portion of the needle shield and permits the hollow needle to pass through the membrane when the needle shield is in the first position. The lips are capable of sealing the outer end of the cylindrical portion of the needle shield when the shield is in the second position with the hollow needle positioned within the cylindrical portion. The sealing membrane is capable of sealing the inner end of the cylindrical portion of the needle shield about the needle when the shield is in the second position with the outlet portion positioned within the slotted portion of the shield.

Description of the Drawings

Figure 1 is a perspective view of the butterfly anchor and an infusion set;

Figure 2 is a plan view of the butterfly anchor;

Figure 3 is a cross sectional view of the butterfly anchor, illustrating the reinforcing means; and

Figure 4 is a cross-sectional view of the **Figure 1** embodiment illustrating the control of the catheter in the vein of a patient.

Detailed Description of the Preferred Embodiment

As shown in **Figure 1**, a safety syringe **10** may be constructed from the following components. A hollow body **14** is provided. The body **14** is of a first predetermined length **18** and has an outer surface **22**, a first end **26**, a second end **30**, cylindrical bore **34** of a first predetermined diameter **38**. Means **42** are provided for gripping the hollow body **14** adjacent the second end **30**. The first end **26** of the hollow body **14** includes an opening **46** of the first predetermined diameter **50**. The second end **30** includes a cavity **54** extending from the cylindrical bore **34** and terminating in an outlet portion **58**. The outlet portion **58** has a first end **62**, a center section **66** and a second end **70** and is fixedly attached at its first end **62** to the cavity **54**. The outlet portion **58** includes an orifice **74** of a second predetermined diameter **78** that extends outward from the cavity **54**.

A hollow needle **82** is provided. The needle **82** has a first end **86** and a second end **90** and is fixedly attached at its first end **86** to the second end **70** of the outlet portion **58** such that fluid **162** may travel from the cylindrical bore **34**, through the cavity **54**, through the outlet portion **58** and through the needle **82**. A plunger **94** is provided. The plunger **94** has a longitudinal shaft **98** longer than the first predetermined length **18**, a first end **102** and a second end **106** (not shown), a thumb pad **110** fixedly attached to the first end **102** of the shaft **98**, and a piston **114**. The piston **114** (not shown) is formed of a resilient material **118**, attached to the second end **106** (not shown) of the shaft **98**, and is sized and shaped to fit sealably within the cylindrical bore **34** of the hollow body **14**.

A needle shield **122** is provided. The shield **122** has an outer surface **126**, a first end **130**, a second end **134**, and is sized and shaped to fit slidably over the needle **82** and at

least a portion of the hollow body **14** of the syringe **10**. Means **138** are provided for securing the needle shield **122** at its first end **26** to the hollow body **14** in a first position **142**. The first position **142** permits the second end **90** of the needle **82** to extend outwardly from the second end **134** of the shield **122**. A second position **146** permits the second end **134** of the needle shield **122** to extend beyond the second end **90** of the needle **82**. Means **150** are provided for moving the needle shield **122** from the first position **142** to the second position **146** using a single hand **154** (not shown). Means **158** are provided for containing any fluid leaking **166** from the second end **90** of the needle **82** within the needle shield **122** when the shield **122** is secured to the hollow body **14** in the second position **146**.

10 In a variant of the invention, as shown in **Figure 2**, the means **170** for securing the needle shield **122** at its first end **130** to the hollow body **14** in first **142** and second positions **146** further includes a first surrounding groove **174**. The first groove **174** is located on the outer surface **22** of the hollow body **14** adjacent its second end **30**. A second surrounding groove **178** is provided. The second groove **178** is located on the outer surface **22** of the hollow body **14** adjacent its first end **26**. An engaging finger **182** is provided. The finger **182** is formed of resilient material **186** and has an upper surface **190**, a lower surface **194**, an activating end **198**, an attaching end **202** and a pivot point **206** located between the ends. A securing tooth **210** is provided. The tooth **210** has an upper end **214** and a lower end **218** and is fixedly attached at its upper end **214** to the lower surface **194** of the engaging finger **182** adjacent the attaching end **202**. The securing tooth **210** is sized, shaped and located to removably engage one of the first **174** and second surrounding grooves **178** on the hollow body **14**.

A mounting post **226** is provided. The post **226** has an upper end **230**, a lower end **234** and is fixedly mounted at its lower end **234** to the outer surface **126** of the needle shield **122** adjacent its first end **130**. The post **226** is fixedly attached at its upper end **230** to the lower surface **194** of the engaging finger **182** at the pivot point **206** such that the

5 resilient material **186** of the engaging finger **182** will bias the securing tooth **210** downward to removably engage one of the first **174** and second surrounding grooves **178**. When pressure is applied to the upper surface **190** of the engaging finger **182** adjacent its activating end **198** the securing tooth **210** will pivot upwardly away from one of the first **174** and second securing grooves **178**, permitting the needle shield **122** to move slidably

10 from the first position **142** to the second position **146**. When the securing tooth **210** is positioned over one of the first **174** and second securing grooves **178** and pressure is relieved from the upper surface **190** of the engaging finger **182** the securing tooth **210** will engage one of the grooves, preventing further movement of the needle shield **122**.

In yet another variant, as shown in **Figure 3**, the means **236** for moving the needle shield **122** from the first position **142** to the second position **146** using a single hand **154** (not shown) further comprises an indentation **238** located on the outer surface **126** of the needle shield **122** adjacent its first end **130** and is sized and shaped to engage a finger pad **242** (not shown) of a user.

In still a further variant of the invention, as shown in **Figure 4**, the means **246** for containing any fluid leaking **166** from the second end **90** of the needle **82** within the needle shield **122** when the shield **122** is secured to the hollow body **14** in the second position **146** includes a sealing membrane **250**. The membrane **250** is fixedly attached to the second end **134** of the needle shield **122** and permits the hollow needle **82** and the second end **70** and

center section 66 of the outlet portion 58 to pass through the membrane 250 when the needle shield 122 is in the first position 142. The sealing membrane 250 is capable of sealing the second end 134 of the needle shield 122 when the shield 122 is in the second position 146 with the hollow needle 82 and outlet portion 58 withdrawn within the shield 122.

In another variant, as shown in **Figure 5**, the means 252 for containing any fluid leaking 166 from the second end 90 of the needle 82 within the needle shield 122 when the shield 122 is secured to the hollow body 14 in the second position 146 includes a sealing membrane 256. The membrane 256 is fixedly attached to the second end 134 of the needle shield 122 and permits the hollow needle 82 to pass through the membrane 256 when the needle shield 122 is in the first position 142. The sealing membrane 256 is capable of sealing the second end 134 of the needle shield 122 when the shield 122 is in the second position 146 with the hollow needle 82 withdrawn within the shield 122.

In still another variant of the invention, as shown in **Figure 6**, the needle shield 122 is formed of a resilient material 254 and the means 258 for containing any fluid leaking 166 from the second end 90 of the needle 82 within the needle shield 122 when the shield 122 is secured to the hollow body 14 in the second position 146 includes a flattened closure means 262 formed at the second end 134 of the needle shield 122. The closure means 262 has a pair of mating lips 266 at the second end 134 permitting the hollow needle 82 and the second end 70 and center section 66 of the outlet portion 58 to pass between them when the needle shield 122 is in the first position 142. The lips 266 are capable of sealing the second end 134 of the needle shield 122 when the shield 122 is in the second position 146 with the hollow needle 82 and outlet portion 58 withdrawn within the shield 122.

In a further variant, as shown in **Figure 7**, the needle shield **122** is formed of a resilient material **254** and the means **270** for containing any fluid leaking **166** from the second end **90** of the needle **82** within the needle shield **122** when the shield **122** is secured to the hollow body **14** in the second position **146** includes a flattened closure means **264** formed at the second end **134** of the needle shield **122**. The closure means **264** has a pair of mating lips **268** at the second end **134** permitting the hollow needle **82** to pass between them when the needle shield **122** is in the first position **142**. The lips **268** are capable of sealing the second end **134** of the needle shield **122** when the shield **122** is in the second position **146** with the hollow needle **82** withdrawn within the shield **122**.

In still a further variant of the invention, as shown in **Figure 8**, a safety infusion set **274** includes a length of flexible tubing **278** having a first end **282** and a second end **286**. A hollow catheter body **290** is provided. The body **290** has a first end **294**, a second end **298**, an outer surface **302** and an outlet portion **306**, and is fixedly attached at its first end **294** to the first end **282** of the tubing **278**. A pair of attachment wings **308** is provided. The attachment wings **308** are fixedly attached to the outer surface **302** of the catheter body **290**. The outlet portion **306** has a first end **310**, a center section **314** and a second end **318** and is fixedly attached at its first end **310** to the second end **298** of the catheter body **290**. A connection fitting **322** attached to the second end **286** of the tubing **278**. A hollow needle **324** is provided. The needle **324** has a first end **328** and a second end **332** and is fixedly attached at its first end **328** to the second end **318** of the outlet portion **306** such that fluid **336** may pass from the flexible tubing **278**, through the catheter body **290** and the outlet portion **306** and outwardly through the hollow needle **324**.

A needle shield 340 is provided. The shield 340 has an outer surface 344, a first end 348, a second end 352, and is sized and shaped to fit slidably over the needle 324, outlet portion 306, and at least a portion of the catheter body 290. The needle shield 340 has a cylindrical portion 342 beginning at the second end 352 of the shield 340. The cylindrical portion 342 has an outer end 346 and an inner end 350 and is sized and shaped to fit over the outlet portion 306, and a slotted portion 354. The slotted portion 354 has a longitudinal slot 358, extending from the inner end 350 of the cylindrical portion 342 toward the first end 348 of the shield 340. The slotted portion 354 is sized and shaped to fit slidably over the hollow catheter body 290 with the slot 354 accommodating an intersection of the wings 308 and the catheter body 290.

Means 355 are provided for securing the needle shield 340 at its first end 348 to the catheter body 290 in a first position 356. The first position 356 permits the second end 332 of the needle 324 to extend outwardly from the second end 352 of the shield 340. A second position 360 permits the second end 352 of the needle shield 340 to extend beyond the second end 332 of the needle 324. Means 364 are provided for moving the needle shield 340 from the first position 356 to the second position 360 using a single hand 368 (not shown). Means 372 are provided for containing any fluid leaking 376 from the second end 332 of the needle 324 within the needle shield 340 when the shield 340 is secured to the catheter body 290 in the second position 360.

In yet another variant, as shown in Figure 9, the means 380 for securing the needle shield 340 at its first end 348 to the catheter body 290 in first 356 and second positions 360 includes a first surrounding groove 384. The first groove 384 is located on the outer surface 302 of the catheter body 290 adjacent its second end 298. A second surrounding

groove 388 is provided. The second groove 388 is located on the outer surface 302 of the catheter body 290 adjacent its first end 294. An engaging finger 392 is provided. The finger 392 is formed of resilient material 396 and has an upper surface 400, a lower surface 406, an activating end 410, an attaching end 414 and a pivot point 418 located between the

5 ends. A securing tooth 422 is provided. The tooth 422 has an upper end 426 and a lower end 430 and is fixedly attached at its upper end 426 to the lower surface 406 of the engaging finger 392 adjacent the attaching end 414.

The securing tooth 422 is sized, shaped and located to removably engage one of the first 384 and second surrounding grooves 388 on the catheter body 290. A mounting post

10 434 is provided. The post 434 has an upper end 438, a lower end 442 and is fixedly mounted at its lower end 442 to the outer surface 344 of the needle shield 340 adjacent its first end 348. The post 434 is fixedly attached at its upper end 438 to the lower surface 406 of the engaging finger 392 at the pivot point 418 such that the resilient material 396 of the engagement finger 392 will bias the securing tooth 422 downwardly to removably engage

15 one of the first 384 and second surrounding grooves 388.

When pressure is applied to the upper surface 400 of the engaging finger 392 adjacent its activating end 410 the securing tooth 422 will pivot upwardly away from one of the first 384 and second securing grooves 388, permitting the needle shield 340 to move slidably from the first position 356 to the second position 360. When the securing tooth

20 422 is positioned over one of the first 384 and second securing grooves 388 and pressure is relieved from the upper surface 400 of the engaging finger 392 the securing tooth 422 will engage one of the grooves, preventing further movement of the needle shield 340.

In still a further variant, as shown in **Figure 10**, the means **446** for moving the needle shield **340** from the first position **356** to the second position **360** using a single hand **450** (not shown) further includes an indentation **454**. The indentation **454** is located upon the outer surface **344** of the needle shield **340** adjacent its first end **348** and is sized and

5 shaped to engage a finger pad **458** (not shown) of a user.

In yet another variant of the invention, as shown in **Figure 8**, the means **462** for containing any fluid leaking **376** from the second end **332** of the needle **324** within the needle shield **340** when the shield **340** is secured to the catheter body **290** in the second position **360** includes a first sealing membrane **466**. The membrane **466** is fixedly attached

10 to the outer end **346** of the cylindrical portion **342** of the needle shield **340** and permits the hollow needle **324** and the second end **318** and center section **314** of the outlet portion **306** to pass through the membrane **466** when the needle shield **340** is in the first position **356**. A second sealing membrane **470** is provided. The second membrane **470** is fixedly attached to the inner end **350** of the cylindrical portion **342** of the needle shield **340** and permits the

15 hollow needle **324** and the second end **318** and center section **314** of the outlet portion **306** to pass through the membrane **470** when the needle shield **340** is in the first position **356**.

The first sealing membrane **466** is capable of sealing the outer end **346** of the cylindrical portion **342** of the needle shield **340** when the shield **340** is in the second position **360** with the hollow needle **324** positioned within the cylindrical portion **342**. The

20 second sealing membrane **470** is capable of sealing the inner end **350** of the cylindrical portion **342** of the needle shield **340** about the needle **324** when the shield **340** is in the second position **360** with the outlet portion **306** positioned within the slotted portion **354** of the shield **340**.

In still a further variant, as shown in **Figure 10**, the means **472** for containing any fluid leaking **376** from the second end **332** of the needle **324** within the needle shield **340** when the shield **340** is secured to the catheter body **290** in the second position **360** includes a first sealing membrane **466**. The first membrane **466** is fixedly attached to the outer end **346** of the cylindrical portion **342** of the needle shield **340** and permits the hollow needle **324** to pass through the membrane **466** when the needle shield **340** is in the first position **356**. A second sealing membrane **470** is provided. The second membrane **470** is fixedly attached to the inner end **350** of the cylindrical portion **342** of the needle shield **340** and permits the hollow needle **324** to pass through the membrane **470** when the needle shield **340** is in the first position **356**. The first sealing membrane **466** is capable of sealing the outer end **346** of the cylindrical portion **342** of the needle shield **340** when the shield **340** is in the second position **360** with the hollow needle **324** positioned within the cylindrical portion **342**. The second sealing membrane **470** is capable of sealing the inner end **350** of the cylindrical portion **342** of the needle shield **340** about the needle **324** when the shield **340** is in the second position **360** with the outlet portion **306** positioned within the slotted portion **354** of the shield **340**.

In yet another variant, as shown in **Figure 11**, the needle shield **340** is formed of a resilient material **478** and the means **482** for containing any fluid leaking **376** from the second end **332** of the needle **324** within the needle shield **340** when the shield **340** is secured to the catheter body **290** in the second position **360** includes a flattened closure means **486** formed at the outer end **346** of the cylindrical portion **342** of the needle shield **340**. The closure means **486** has a pair of mating lips **490** at the outer end **346** permitting the hollow needle **324** and the second end **318** and center section **314** of the outlet portion

306 to pass between them when the needle shield 340 is in the first position 356. A sealing membrane 480 is provided. The membrane 480 is fixedly attached to the inner end 350 of the cylindrical portion 342 of the needle shield 340 and permits the hollow needle 324 and the second end 318 and center section 314 of the outlet portion 306 to pass through the

5 membrane 480 when the needle shield 340 is in the first position 356. The lips 490 are capable of sealing the outer end 346 of the cylindrical portion 342 of the needle shield 340 when the shield 340 is in the second position 360 with the hollow needle 324 positioned within the cylindrical portion 342. The sealing membrane 480 is capable of sealing the inner end 350 of the cylindrical portion 342 of the needle shield 340 about the needle 324

10 when the shield 340 is in the second position 360 with the outlet portion 306 positioned within the slotted portion 354 of the shield 340.

In a final variant, as shown in Figure 12, the needle shield 340 is formed of a resilient material 498 and the means 502 for containing any fluid leaking 376 from the second end 332 of the needle 324 within the needle shield 340 when the shield 340 is

15 secured to the catheter body 290 in the second position 360 includes a flattened closure means 506 formed at the outer end 346 of the cylindrical portion 342 of the needle shield 340. The closure means 506 has a pair of mating lips 510 at the outer end 346 permitting the hollow needle 324 to pass between them when the needle shield 340 is in the first position 356. A sealing membrane 488 is provided. The membrane 488 is fixedly attached

20 to the inner end 350 of the cylindrical portion 342 of the needle shield 340 and permits the hollow needle 324 to pass through the membrane 488 when the needle shield 340 is in the first position 356. The lips 510 are capable of sealing the outer end 346 of the cylindrical portion 342 of the needle shield 340 when the shield 340 is in the second position 360 with

the hollow needle **324** positioned within the cylindrical portion **342**. The sealing membrane **488** is capable of sealing the inner end **350** of the cylindrical portion **342** of the needle shield **340** about the needle **324** when the shield **340** is in the second position **360** with the outlet portion **306** positioned within the slotted portion **354** of the shield **340**.

- 5 The safety syringe/catheter **10** has been described with reference to particular embodiments. Other modifications and enhancements can be made without departing from the spirit and scope of the claims that follow.